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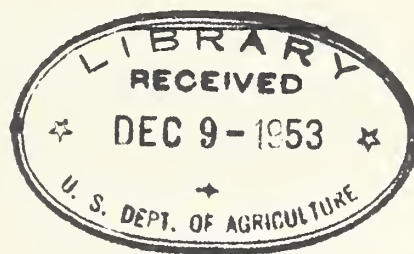
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A L A S K A   7   J U N E A U

SPECIAL FIELD STUDY

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Prepared by  
Economic Analysis Section  
Electric Operations and Loans Division  
RURAL ELECTRIFICATION ADMINISTRATION



Completed in  
July 1953

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November 2, 1953

Economic Analysis Section  
Electric Operations and Loans Division

SUMMARY AND CONCLUSION  
ALASKA ? JUNEAU

AREA CHARACTERISTICS

The Auke Bay area wherein the Glacier Highway Electric Association, Incorporated, is located lies approximately 10 miles northwest of Juneau. It is open on the southwest to numerous channels and the sea, and it is backed up to the northeast by rough terrain including Auke Mountain, McGinnis Mountain, and the renowned Mendenhall Glacier. Although population in the Juneau area increased only moderately from 1945-1950, the estimate of 8,400 for the city including residences adjacent to the city limits in 1953 is appreciably greater than a comparable figure for the area in 1950. There is very little farming in the vicinity of Juneau and only one farm consumer is connected to the cooperative's lines. Year-round employment includes trade, service, transportation, and government. Being the capital city, Juneau provides for the bulk of Alaska territorial and U. S. Government employment in the territory. Seasonal employment includes fishing, food processing, mining, construction, and lumbering.

ULTIMATE NUMBER OF CONSUMERS

As of July 1953, this cooperative was serving 211 consumers. After a careful consideration of the factors believed to be significant, an ultimate number of 400 consumers appears reasonable.

ESTIMATED FUTURE CONSUMPTION OF ELECTRICITY

In view of the data available and the analysis herein, the following average monthly consumption estimates might reasonably be expected to be attained by the years specified:

<u>Class of Consumer</u>	<u>12 Months Ended July 1953</u>	<u>1955</u>	<u>1958</u>	<u>1963</u>
Farm	353	450	500	550
Nonfarm Residential	149	160	190	225
Seasonal (annual)	240	325	410	500
Small Commercial	326	370	420	500
Public Buildings	17	30	40	50
Other Commercial (annual)				
Alaska Communications System		100,000	100,000	100,000
Civil Aeronautics Administration		40,000	60,000	60,000
Dehart Store		25,000	25,000	25,000
Hickeys		35,000	35,000	35,000
Sawmill		250,000	250,000	250,000



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Total Power Requirements

Based on this study, the total power requirements for this system (including system losses) are estimated to be 1,031,000 kwh for 1955, 1,284,000 kwh for 1958, and 1,723,000 kwh for 1963. Total kw demand is estimated at 278 kw for 1955; 343 kw for 1958, and 461 kw for 1963. Load factors used were 42.3 percent for 1955 and 42.7 percent for 1958 and 1963.

Richard G. Schmitt, Jr.  
Head, Economic Analysis Section  
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November 2, 1953

Economic Analysis Section  
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FIELD APPRAISAL AND  
POWER REQUIREMENT STUDY  
ALASKA 7 JUNEAU :

This study of basic factors related to the future consumption of electricity and power requirements for consumers of the Glacier Highway Electric Association, Incorporated, with headquarters at Auke Bay, Alaska (Figure 1), is based on field data gathered by Messrs. Kenneth O. Peters and Richard G. Schmitt, Jr., during the period July 21 to 25, 1953. The field work consisted of interviews with 32 randomly selected residential consumers and inspections of the larger commercial consumers. The area was considered with respect to factors affecting future use of electricity and power needs. Businessmen, bankers, and federal and territorial officials were visited and the possibilities of and proposed plans for the area were discussed. Supporting data were obtained from the U. S. Census and from other secondary information.

HISTORICAL SKETCH

This cooperative was energized on July 6, 1949. On July 31, 1953, there were 211 connected consumers of which 146 were served nonfarm, 52 were seasonal (summer homes), 12 small commercial and one farm. A total of \$230,000 has been loaned to the association of which \$173,159 has been advanced. The system is composed of 42 miles of 3-phase distribution line. Currently, the association is building a storage shed and office building on a new site.

PHYSICAL CHARACTERISTICS

As can be seen in Figure 1, the service area lies approximately 10 miles northwest of Juneau and extends along the coast. It is open to the southwest to numerous channels and to the sea and it is backed up to the northeast by rough terrain including Auke Mountain, McGinnis Mountain, and the renowned Mendenhall Glacier. Residents generally agree that the Auke Bay area is milder and with less precipitation than Juneau or the small neighboring town of Douglas and is as choice a place to live as anywhere in the vicinity of Juneau. The recreational opportunities seem to be an outstanding resource of the area. There is very little farming and, although there are substantial stands of spruce and hemlock as well as cedar on nearby islands, the probability of large scale logging and lumbering in the area is regarded as questionable at this time. The soil needs constant attention especially in the provision of humus so that residents might have productive gardens.

At Juneau the average January temperature is 27.5° F., and the average July temperature is 56.6° F. The growing season averages 172 days. The average annual precipitation is 83.25 inches about 20 percent of which falls during the period June 1 to September 1.

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The following excerpts concerning the physical characteristics of the general area were taken from "A Report on Exploratory Investigations of Agricultural Problems in Alaska", miscellaneous publication No. 700, Agricultural Research Administration, USDA, December 1949.

Only a few small areas of arable land are present at the base of the high rugged and heavily forested region in southeastern Alaska. Some of these areas, consisting mostly of tidal flats are used for dairy, poultry, and truck farming. No land in this region is suitable for range livestock production, and none is available for expansion of other forms of agriculture.

Small areas of soil suitable for gardens are rather abundant. This part of the territory consists mainly of mountains and many of the valleys are occupied by glaciers. There is very little level land. The narrow, level bottom lands, interspersed with many lakes are usually wet. Soils are generally shallow and overlie bed rock except in the lower valleys on talus slopes, in coves, and on some narrow coastal strips. The climate is characterized by mild winters, cool summers and abundant precipitation.

At Juneau the commercial greenhouses are devoted primarily to flowers (cut and potted plants), although early garden plants of all kinds are grown.

Juneau and the area in its immediate vicinity are representative of the communities in southeastern Alaska. The area is rich in recreational opportunities, but not in agricultural land. During the war (World War II), a victory garden site large enough for the city, with soil suited for gardening was worked several miles from the city on alluvial bottom land at the mouth of Salmon Creek. The topsoil used for the gardens was hauled from a delta deposit near the mouth of Lemon Creek about 6 miles away.

Five dairy farms are located on an area of several hundred acres of alluvial bottom land (near Juneau) on a narrow coastal strip. Here the soils are moderately well to imperfectly drained. The most prominent soil on these farms is a very friable, mottled light gray and brown very fine sandy loam surface soil 6 to 10 inches thick which breaks easily, to a soft crumb structure, and a mottled light olive gray and brown loamy fine sand subsoil slightly compact in place but loose when removed.

In 1938 Sitka spruce and alder were removed from one 30-acre field in this area and land was broken and seeded to timothy and clover. The cost of clearing and preparing this field for seeding was \$7,000.

A typical upland soil with an 8 percent gradient is found along the Glacier Highway, at Point Louise, northwest of Juneau. Its best use is in its present native forest cover. It supports tall hemlock and Sitka spruce with a thick undergrowth of alder, red-huckleberry, thimbleberry, goatsberry, creeping-raspberry, dwarf-dogwood, ferns and devilsclub.



# ECONOMIC CHARACTERISTICS

Considering the general vicinity of Juneau of which this service area may be regarded as a part, the population is likely to be stable with some secular rise, the intensity of which is geared to the over-all Alaskan economy. Juneau grew in population from 5,729 in 1939 to 5,956 in 1950. This was nearly a 4 percent increase. According to estimates made by the Seattle Chamber of Commerce, the population (including residences adjacent to the city limits) was 8,400 in 1953. The population of Auke Bay for 1950 was 1,139. The city of Juneau has had some new housing developments; but because of the limitations of expansion due to the mountains on one side and the channel on the other, not much new housing development is expected to take place. The Auke Bay community is becoming a year-round type of economy in spite of the apparent distance to Juneau. The Glacier Highway was paved in 1952 and a substantial amount of building of residences and for small commercial use is presently underway. The trend of townspeople building cabins which start out as seasonal dwellings and gradually become year-round residences is evident. In 1952 rents for one bedroom apartments at Juneau started at \$80, but housing shortage was acute.

The Alaska Steamship Company operates passenger vessels and a large fleet of cargo vessels from Seattle, Washington, to Juneau and other Alaskan ports. The Canadian Steamship Company also makes stops at Juneau. The harbor is open all year. The nearest railroad is at Skagway. The best travel accommodations from Juneau to other parts of the territory are by air. An airport is located on the Glacier Highway between Juneau and Auke Bay.

The year-round industries in the Juneau area include trade service, transportation, and government. Those of seasonal character are fishing, food processing, mining, construction, and lumbering.

## ESTIMATED DISTRIBUTION OCCUPATION OF HEAD OF HOUSEHOLD SAMPLE CONSUMERS

<u>Occupation</u>	<u>Class of Consumer</u>	
	<u>Nonfarm</u> (%)	<u>Seasonal</u> (%)
Government Worker	15	10
Skilled Trades	15	25
Business Proprietors	10	25
Construction	10	—
Sales	10	10
Professional	10	—
Transportation	10	10
Retired	10	10
Self Employed	5	10
Service Worker	5	—
Total	100	100

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At one time the Alaska Juneau gold mine provided direct employment for several persons in the Juneau area, but since 1946 it has been closed. When active and operating, this mine produced more than 12,000 tons of ore daily. At today's wage rates, the price of gold would need to be more than \$80 an ounce to make it a profitable operation. A plywood plant was constructed in the area in 1952 and now is in operation. The Forest Service believes that a 300 to 1,000 ton pulpwood plant may be installed in the near future. This would provide employment for approximately 100 men.

Juneau has the many facilities of larger cities in the United States. However, some are antiquated. Among the facilities is a hospital having 55 beds and 8 bassinets.

The annual Territorial Sportsman's Association Derby is staged at Juneau usually in July. Fishermen compete for a host of prizes by fishing in the bays and inlets for king and coho salmon.

RELATION OF SOUTHEASTERN ALASKA AGRICULTURE  
TO THAT OF THE ENTIRE TERRITORY, 1952<sup>a/</sup>

Livestock and Livestock Products (Sales)

	<u>Milk</u> (pounds)	<u>Eggs</u> (dozen)	<u>Beef</u> (pounds)	<u>Pork</u> (pounds)	<u>Broilers</u> (pounds)
Total for Alaska	9,705,595	303,900	238,920	119,900	243,725
Southeastern Alaska	2,219,200	45,675	25,000	900	40,000
Percent of Total	22.9	15.0	10.5	.8	16.4

Livestock on Farms

	<u>Laying</u> <u>Hens</u>	<u>Dairy</u> <u>Cattle</u>	<u>Other</u> <u>Cattle &amp;</u> <u>Calves</u>	<u>Sheep &amp;</u> <u>Goats</u>	<u>Hogs</u>
Total for Alaska	29,458	1,808	2,650	11,581	548
Southeastern Alaska	2,000	430	165	78	25
Percent of Total	7.8	2.4	6.2	.7	4.6

Vegetable Production

	<u>Potatoes</u> (tons)	<u>Cabbage</u> (tons)	<u>Carrots</u> (tons)	<u>Rutabagas</u> (tons)	<u>Lettuce</u> (tons)	<u>Radishes</u> (tons)
Total for Alaska	4,893	278	103	36	175	15
Southeastern Alaska	100	12	4	6	3	2
Percent of Total	2.0	4.3	3.9	16.7	1.7	13.3

<sup>a/</sup> Source: Fourth Biennial Report, Department of Agriculture, Territory of Alaska.

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In interpreting the data on agriculture in southeastern Alaska, it should be pointed out that approximately one-fifth of the territorial population reside there.

Interviews with the nonfarm residences in the service area revealed the only electric energy being used for production to be in connection with incubation and brooding chicks. It is interesting to point out in this connection that a report "July 1 Crop Prospects, 1953" from the Alaska Department of Agriculture revealed that Juneau and Ketchikan report 10,250 chicks purchased in 1953 and a sizeable fryer operation is located at Petersburg.

#### NUMBER OF CONSUMERS

The following numbers of consumers by class are estimated as being reasonable and likely to be attained over the 10-year period:

TABLE I

#### ESTIMATED NUMBER OF CONSUMERS BY CLASS 1955, 1958, 1963

Class of Consumer	Number of Consumers Connected July 1953	1955	1958	1963
Farm	1	1	1	3
Nonfarm Residential	131	175	220	300
Seasonal	50	60	65	75
Small Commercial	8	10	12	15
Public Buildings	2	2	3	5
Other Commercial	5	5	5	5
Total	197	253	306	403

Some of the factors which were regarded as probable for encouraging additional numbers of consumers in this area were:

1. Present service area is attractive and home sites are available. In the past, it has been difficult to secure a land patent. Due to the transfer of responsibility for the development of homesites in the area from the Forest Service to the Bureau of Land Management, 400 new homesites have been made available, approximately 250 of which are likely to be taken in the cooperative's service area.
2. A public utility district has been formed to explore and proceed with developing water facilities for the area.
3. A pilot plant plywood mill may open way for additional lumbering and related work in the area.



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4. Position of Juneau with respect to development of Alaska in a time of defense needs and territorial development partly due to an expanding nationwide population.

Some factors which were regarded as likely to deter the growth in numbers of consumers in this area were:

1. Undeveloped water facilities.
2. Slow road building and improvement.
3. Distance to commute to work in Juneau.
4. Workers in Juneau may prefer Douglas to Auke Bay for their home because of difference in distance.

NATURE OF PRESENT AND INDICATED FUTURE CONSUMPTION  
OF ELECTRICITY AS REVEALED BY THE SURVEY

The tabulation of raw data secured from the respondents revealed the monthly consumption figures shown in the following table:

TABLE II

INDICATED MONTHLY KWH CONSUMPTION<sup>a/</sup>

Class of Consumer	Present	Future <sup>b/</sup>	Percent Increase
Farm	251	572	128
Nonfarm Residential	204	273	34
Seasonal (annual basis) <sup>c/</sup>	517	996	93

a/ Based on indications by respondents in the survey and average energy requirements as determined by REA for the country at large.

b/ Based on what respondents expect to add in 3 years.

c/ Used over a 6-month period on the average.

Based on indications of consumers in the sample, it is estimated that 60 percent of all consumers will not add any electrical appliance within the next 3 years. For the 12 months ended July 1953, nonfarm residential consumers averaged 141 kwh; seasonal consumers averaged 36 kwh per month based on a 6 months per year basis for the same period. Since nonfarm residential consumers indicated a present consumption of 204 kwh and seasonal 517 kwh (annual), it appears that nonfarm consumers are using 69 percent of the average for the United States at large as determined by REA; summer home consumers are using 43 percent of this average.

TABLE V  
HISTORICAL CONSUMPTION OF  
SEASONAL CONSUMERS<sup>a/</sup>

<u>Years</u> <u>Connected</u>	<u>Number of</u> <u>Consumers</u>	<u>1950</u>		<u>1951</u>		<u>1952</u>		<u>1953<sup>b/</sup></u>	
		<u>Ave. :No.</u>	<u>Mo. :Mo.</u>	<u>Ave. :No.</u>	<u>Mo. :Mo.</u>	<u>Ave. :No.</u>	<u>Mo. :Mo.</u>	<u>Ave. :No.</u>	<u>Mo. :Mo.</u>
		<u>Cons. :Use</u>		<u>Cons. :Use</u>		<u>Cons. :Use</u>		<u>Cons. :Use</u>	
1950	4	28	5	26	7	37	6	20	2
1951	1	--	--	50	4	74	6	25	2
1952	4	--	--	--	--	21	5	25	4

a/ Average monthly consumption based on number of months used.

b/ First 6 months.

COMPETITIVE ENERGY USE

Fuel oil competes with electricity in this area. From the sample it is estimated that 80 of the nonfarm and all of the seasonal consumers use oil for one or more purposes in the home.

TABLE VI  
ESTIMATED USE OF FUEL OIL BY PURPOSE

<u>Use</u>	<u>Percent of Consumers</u> <u>Using Fuel Oil</u>	
	<u>Nonfarm</u>	<u>Seasonal</u>
Range	65	70
Water Heating	41	--
House Heating	82	100
Chick Brooding	6	--

Of those 20 percent in the nonfarm class not using oil, one-quarter expect to use oil in the future for house heating. Fuel oil is presently selling for 18¢ per gallon.

ANALYSIS OF FUTURE KWH CONSUMPTION

Since this cooperative was energized in 1949, the average monthly nonfarm residential consumption rose to 141 kwh for the 12 months ended July 1953. Over the period from January 1951 to present there has been an increase of 25 kwh per month per year. Seasonal consumers' consumption was 216 for the 12 months ended July 1953. This is little change from the preceding 12 months' period.



To achieve the indicated average of 176 kwh per month for nonfarm residential consumers (131 x 1.34), the kwh resulting from appliance use shown in Tables III and VII must be achieved. Likewise, seasonal consumers would require similar growth to reach an annual average of 417 kwh (216 x 1.93).

Other considerations as affect of competitive energy use, power consumption education and trends in levels of living must be considered in addition to what the respondents indicate to be their future intentions to use electricity are likely to be. These other factors have been taken into consideration in estimating the increase in kwh use shown in Table VII.

TABLE VII

INDICATED AND ESTIMATED KWH USAGE, NONFARM  
AND SEASONAL CONSUMERS BY CHARACTER OF  
LOAD PER 100 CONSUMERS, 1956<sup>a/</sup>

Use	:: Indicated ::		:: Estimated ::		:: Present ::		:: Estimated	
	:: Increase ::		:: Increase ::		:: Use ::		:: Future Total	
	:: Non-:Sea- ::		:: Non-: Sea- ::		:: Non-:Sea- ::		:: Non-:Sea-	
	:: farm:sonal ::		:: farm: sonal ::		:: farm:sonal::		:: farm:sonal	
<u>Major Household Uses</u>								
Water Heater w/bath	20,700	12,900	15,448	8,448	39,330	54,778	8,448	
Electric Range	11,592	2,580	8,651	1,690	27,324	5,160	35,975	6,850
Home Freezer	8,694	---	6,488	---	8,964	---	15,182	---
Clothes Drier	6,762	1,505	5,046	986	2,415	---	7,461	986
Oil Furnace	2,898	---	2,163	---	2,070	---	4,233	---
Refrigerator	2,484	774	1,854	507	18,878	4,644	20,732	5,151
Roaster	1,656	---	1,236	---	4,637	---	5,873	---
Pressure System	1,242	1,548	927	1,014	4,720	---	5,647	1,014
<u>Miscellaneous</u>	635	953	475	624	60,844	12,427	61,319	13,051
Total	56,663	20,260	42,288	13,269	168,912	22,231	211,200	35,500

Estimated average monthly kwh consumption nonfarm residential consumers-  
1956

176

Estimated average annual kwh consumption seasonal consumers - 1956

355

<sup>a/</sup> Adjusted to take into account that appliance usage and amount of electricity required is only 69 percent (for seasonals 43 percent) of the average for the United States for nonfarm consumers as determined by REA.

TABLE VIII

## ESTIMATE OF LOADS - AUKE BAY SUBSTATION AREA

ALASKA 7 JUNEAU	TYPE OF CONSUMER	NUMBER OF CONSUMERS			KW DEMAND			ANNUAL KWH REQUIREMENTS		
		1955	1958	1963	1955	1958	1963	1955	1958	1963
	FARM	1	1	3	21.683 2	21.815 2	21.937 6	5,400	6,000	6,600 19,800
	NONFARM RESIDENTIAL	175	220	300	20.689 121	20.770 169	20.870 261	219,200 336,000	222,800 501,600	227,000 810,000
	SEASONAL	60	65	75	20.260 A/ 16	20.324 A/ 21	20.386 A/ 29	232,500 19,500	241,000 26,650	250,000 37,500
	SMALL COMMERCIAL	10	12	15	21.399 14	21.545 19	21.771 27	244,400 44,400	250,400 60,480	260,000 90,000
	PUBLIC BUILDINGS	2	3	5	20.148 3	20.193 6	20.233 12	236,000 720	248,000 1,440	260,000 3,000
	A.C.S.	1	1	1	230/1.2DF 25	230/1.2DF 25	230/1.2DF 25	100,000	100,000	100,000
	CAA POINT LENA	1	1	1	210/1.2DF 8	215/1.2DF 12	215/1.2DF 12	40,000	60,000	60,000
	DEHART STORE	1	1	1	212/1.2DF 10	212/1.2DF 10	212/1.2DF 10	25,000	25,000	25,000
	HICKEY'S	1	1	1	215/1.2DF 12	215/1.2DF 12	215/1.2DF 12	35,000	35,000	35,000
	SAWMILL	1	1	1	2100/1.5DF 67	2100/1.5DF 67	2100/1.5DF 67	250,000	250,000	250,000
	SUB-TOTAL							856,020	1,066,170	1,430,300
	PLUS DIST. LOSSES (APPROX.)							217% 174,980	217% 217,830	217% 292,700
	TOTAL	253	306	403	278	343	461	1,031,000	1,284,000	1,723,000
					ANNUAL LOAD FACTOR -			42.3%	42.7%	42.7%

A/ KW DEMAND BASED ON 6 MONTHS' CONSUMPTION.







